

**ABSTRACT**

A device for carrying out a plasma enhanced process, in particular a plasma enhanced chemical vapour deposition process, comprises within a vacuum chamber at least one magnetron electrode (32) constituting an unbalanced magnetron having a flat magnetron face (20) with peripheral and central magnetic poles of opposite polarities and being connected to a source (34) of an alternating voltage. The device further comprises means for positioning a substrate (25) with a surface to be treated facing the magnetron face (20) and gas supply means for supplying a process gas or process gas mixture to the space between the magnetron face (20) and the surface to be treated. For achieving an optimum deposition rate, the distance between the magnetron face (20) and the surface to be treated is adapted to the magnetic field created by the magnetron electrode (32) such that there is a visible plasma band running between darker tunnels formed by magnetic field lines extending between peripheral and central magnetic poles of the magnetron face (20) and the surface to be treated, the plasma band having a minimum width but having towards the surface to be coated a homogeneous brightness. The distance between the surface to be treated and the magnetron face is preferably between 2 and 20% larger than the height of the tunnels. The device is applicable e.g. for coating a web of a polymer film material with silicon oxide in order to improve its barrier properties.

20 (Figure 3)